

2023
M. Tech. (Micro-Electronics)
First Semester
MIC-101: Semiconductor Device Physics

Time allowed: 3 Hours

Max. Marks: 50

NOTE: Attempt five questions in all, including Question No. 1 which is compulsory and selecting two questions from each Unit.

x-x-x

- I. Attempt the following:-
- Define Quasi Fermi energy level?
 - Differentiate between HBJT and BJT.
 - Define effective mass.
 - Why the turn on transient of BJT is faster when the device is driven into oversaturation?
 - Discuss imperfections and impurities in solids. (5x2)

UNIT - I

- II. Discuss position of Fermi level for n-type and p- type semiconductor. Comment on variation of E_f with doping concentration and temperature. (10)
- III. How probability density function is useful in semiconductors? Explain in detail. (10)
- IV. Define electron mobility. Explain its importance? Calculate the Quasi Fermi levels for electrons and holes. (10)

UNIT - II

- V. Draw and explain the energy diagram for the Ideal MOS structure at equilibrium. Explain its non ideal effects also. (10)
- VI. Explain the frequency limitation factors in MOSFET. Derive relation for cut off frequency in ideal case. (10)
- VII. Discuss the working of Heterojunction Bipolar Transistor. List its application. (10)

x-x-x